Polycyclic Aromatic Hydrocarbons (PAHs)

What are PAHs?

Short for polycyclic aromatic hydrocarbons, PAHs describe chemicals that are often found together in groups of two or more. PAHs are found naturally in the environment but they can also be man-made. In their purest form, PAHs are solid and range in appearance from colorless to white or pale yellow-green. PAHs are created when products like coal, oil, gas, and garbage is burned but the burning process is not complete. Although PAHs can exist in over 100 different combinations, the most common are treated as a group of 15. They are:

1. acenaphthene
2. acenaphtylene
3. anthracene
4. benz(a)anthracene
5. benzo(a)pyrene
6. benzo(b)fluoranthene
7. benzo(ghi)perylene
8. benzo(k)fluoranthene
9. chrysene
10. dibenz(a,h)anthracene
11. fluoranthene
12. fluorene
13. indeno(1,2,3-cd)pyrene
14. phenanthrene
15. pyrene

What are PAHs used for?

Most of the PAHs are used to conduct research. However, some of the PAHs are used to make dyes, plastics and pesticides. Some are even used in medicines.

How can PAHs enter and leave your body?

One of the most common ways PAHs can enter the body is through breathing contaminated air. The PAHs get into your lungs when you breathe them. If you eat or drink food and water that are contaminated with PAHs, you could be exposed. Exposure to PAHs can also occur if your skin touches PAH contaminated soil or products like heavy oils, coal tar, roofing tar or creosote. Creosote is an oily liquid found in coal tar and is used to preserve wood. Once in your body, the PAHs can spread and target fat tissues. Target organs include kidneys, liver and fat. However, in just a matter of days, the PAHs will leave your body through urine and feces.

How can you be exposed to PAHs?

You can be exposed to PAHs in the environment, in your home and in the workplace. Because PAHs exist naturally in the environment, and they are man-made, you can be exposed in a number of ways. Fumes from vehicle exhaust, coal, coal tar, asphalt, wildfires, agricultural burning and hazardous waste sites are all sources of exposure.

You could be exposed to PAHs by breathing cigarette and tobacco smoke, eating foods grown in contaminated soil, or by eating meat or other food that you grilled. Grilling and charring food actually increases the amount of PAHs in the food.

If you work in a plant that makes coal tar, asphalt and aluminum, or that burns trash, you can be exposed to PAHs. You can also be exposed if you work in a facility that uses petroleum or coal, or where wood, corn and oil

are burned.

What are the health effects of exposure to PAHs?

A number of PAHs have caused tumors in laboratory animals that were exposed to PAHs through their food, from breathing contaminated air, and when it was applied to their skin. When pregnant mice ate high doses of a PAH (benzo(a)pyrene) they experienced reproductive problems. In addition, the offspring of the pregnant mice showed birth defects and a decrease in their body weight. Other effects include damage to skin, body fluids and the immune system which help the body fight disease. However, these effects have not been seen in humans.

What levels of exposure have resulted in harmful health effects?

There is no information available from studies on humans to tell what effects can result from being exposed to individual PAHs at certain levels. However, breathing PAHs and skin contact seem to be associated with cancer in humans. Animal studies showed that exposing mice to 308 parts per million (ppm) of PAHs (specifically benzo(a)pyrene) in food for 10 days (short-term exposure) caused birth defects. Mice exposed to 923 ppm of benzo (a) pyrene in food for months developed problems in the liver and blood.

Where can I get more information?

Contact your state health or environmental department, or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road, N.E., E-29
Atlanta, Georgia 30333

References

1. Agency for Toxic Substances and Disease Registry (ATSDR). *Public Health Statement, Polycyclic Aromatic Hydrocarbons*. Atlanta, GA: U.S. Department of Health and Human Services, 1990.